

Standard Form vs. Vertex Form

Standard Form of a Quadratic: $y = ax^2 + bx + c$

Examples: $y = x^2 - 6x + 8$ or $y = 2x^2 + 13x + 6$

Vertex form of a Quadratic: $y = a(x-h)^2 + k$

Examples: $y = (x-3)^2 + 7$ or $y = -2(x+1)^2$

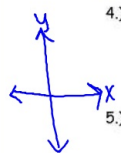
1.) Axis of Symmetry - line that divides the parabola into 2 mirror images
Standard Form: $x = \frac{-b}{2a}$
Vertex Form: $x = h$

2.) Vertex - intersection of the parabola and the line of symmetry
Standard Form: $(\frac{-b}{2a}, \text{plug in for } x)$
Vertex Form: (h, k)

3.) Direction of Opening:
If $a > 0$, then parabola opens up and vertex is a minimum
If $a < 0$, then parabola opens down and vertex is a maximum

4.) Y-intercept - intersection of the parabola and the y-axis
Steps for the y-intercept and reflection point
plug 0 in for x + solve for y.

5.) X-intercept - intersection of the parabola and the x-axis
Steps for the x-intercept and reflection point
plug 0 in for y + solve for x.



standard

Example 1: Graph $y = x^2 + 6x + 8$

$a=1$ $b=6$ $c=8$

1.) Axis of symmetry $x = -3$ $\frac{-b}{2a}$

$x = \frac{-6}{2(1)} = \frac{-6}{2} = -3$

2.) Vertex $(-3, -1)$

$(-3)^2 + 6(-3) + 8$

$a - 18 + 8$

3.) Direction of Opening: up $a \oplus$

point!

4.) Find the y-intercept

$(x=0)$ $y = (0)^2 + 6(0) + 8$

$(0, 8)$

2 points!

5.) Find the x-intercept

$(y=0)$ $0 = x^2 + 6x + 8$

$0 = (x+4)(x+2)$

$x+4=0$ $x+2=0$

$x=-4$ $x=-2$

vertex

Example 2: Graph $y = (x-2)^2 + 5$

$a=1$ $h=2$ $k=5$

1.) Axis of symmetry $x=2$

$x=h$

point! 2.) Vertex $(2, 5)$

(h, k)

3.) Direction of Opening: up $a \oplus$

point

4.) Find the y-intercept

$(x=0)$ $y = (0-2)^2 + 5$

$y = 9$

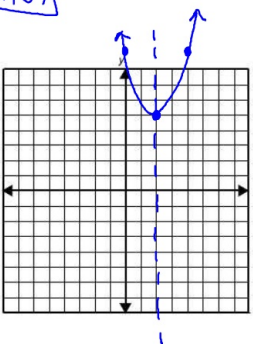
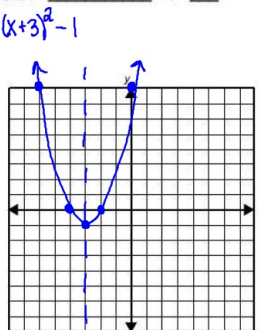
5.) Find the x-intercept

$(y=0)$ $0 = (x-2)^2 + 5$

$-5 = (x-2)^2$

$\sqrt{-5} = x-2$

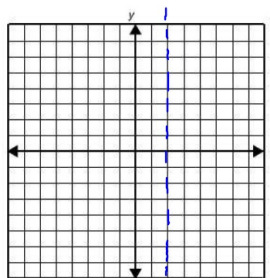
$x = 2 + \sqrt{-5}$ none
does not exist



standard

Example 3: $y = x^2 - 4x - 12$

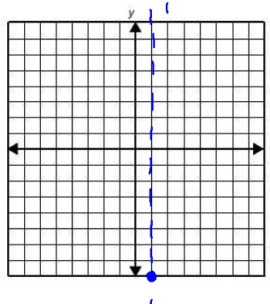
- 1.) Find axis of symmetry: $-\frac{b}{2a}$
 $x = \frac{4}{2(1)} = \frac{4}{2} \quad \boxed{x=2}$
- 2.) Find the vertex. $(2, -16)$
 $(2)^2 - 4(2) - 12 = -16$
- 3.) Direction of Opening: $a > 0$ up
- 4.) Find the y-intercept
(x = 0)
- 5.) Find the x-intercept
(y = 0)



vertex

Example 4: $y = 2(x-1)^2 - 8$

- 1.) Find axis of symmetry: $x=h$
 $x=1$
- 2.) Find the vertex.
 $(h, k) \quad (1, -8)$
- 3.) Direction of Opening: $a > 0$ up
- 4.) Find the y-intercept
(x = 0)
- 5.) Find the x-intercept
(y = 0)



Winter Break Packet

Winter Break packet
due tomorrow
Jan. 4th

